

# Native California grasslands transformed over time

The unmistakable shifting color of the surrounding grasslands marks the seasons' movement through the year at LLNL. While the Livermore skies have been filled with lumbering, slate gray clouds that pull along damp chilly breezes, the expanse of grasslands beneath dazzles the eye with a vibrant lime green hue. Although these grasses will not grow much until spring, the swaying fields distinctly tell us that spring is coiled tightly and about to let loose. Then the golden grasslands will sway again, with rains surely gone for months to come.

Most of us are aware of the staggering loss of California wetlands and riparian areas (i.e., 91 and 89 percent, respectively). Yet most remain unaware that California has lost 99 percent of its native grasslands. One-fourth of the state was once covered with native perennial grasslands; now only small, patchy remnants remain. Despite incurring the highest percentage loss, native grasslands remain less protected than other ecosystems. While grasslands in this area seem ubiquitous (their extent is relatively preserved), the character of these grasslands has absolutely changed.

Two broad categories of California grasslands exist: coastal and valley grasslands. Valley grasslands largely occur across flat areas in the Central Valley, yet also rise over the low-lying, surrounding foothills. Native valley grasslands were dominated by perennial species, although sparse historical information leaves uncertainty about the specific plants. These native valley grasslands were lost in two ways: many were entirely obliterated for cultivation or development while others were lost through significant alterations.

No single cause resulted in this rapid, dramatic habitat loss and conversion (esp. 1850-1880s); rather, multiple factors worked in concert. Factors included non-native plant and wildlife (livestock) introductions, altered grazing pressures, cultivation, development and fire suppression. High grazing pressure diminished native perennial grasses and favored exotic annual plant species. Cultivation also altered the landscape with agricultural fields entirely replacing grasslands. This allowed Mediterranean grasses to take hold, species that are more resilient to variable weather and grazing conditions. A shift from a perennial to annual dominated grassland occurred, forever changing the character of its habitats, wildlife communities and overall ecosystem health.

Site 300 offers a rare glimpse of



By Jessie Coty

what these native California grasslands may have looked like before Europeans arrived. Site 300 is a small remnant, a 477-acre history book of sorts. The dominant plant in this remnant is one-sided bluegrass (*Poa secunda*) with some purple needle-

grass (*Nassella pulchra*). A positive legacy of federal land ownership is that these usually large, relatively undeveloped expanses of land often provide an oasis for wildlife, plants, and ecosystems. At Site 300, annual controlled burns favor native perennial grass species.

Yet more than 80 percent of the habitat at Site 300 is now comprised of exotic California annual grasslands, widely rolling over 5,533 acres. Seeds are stored over the dry season in soil seed banks, remaining viable for several years. Each square meter of soil under these grasslands may store between 300 to 150,000 seeds.

Once the first fall rains exceed 15 millimeters, the seeds germinate and slowly grow over winter. In spring, the plants rapidly grow, maturing between late April and June.

Grasses are flowering plants, just like the vibrantly (exotic) yellow-petaled mustard flowers now widely blooming within these grasslands. Yet, grasses rely upon the wind for pollen transfer rather than insects. Why put energy into developing colorful, showy flower parts when these are unneeded to attract insects? Rather, grasses have anthers (pollen sacs) that dangle from slender stalks or filaments; the stigma (part of the flower that captures airborne pollen) is often large and feathery. Not overly charismatic, yet efficient.

Grasslands tend to occupy vast geographical areas; protecting them conserves open space, habitats and biodiversity. Other benefits of both native and exotic grasslands include carbon storage, high primary productivity, economic value (e.g., herbivore productivity) and aesthetic value. Native grasslands support a diversity of species that differ from the more common annual exotic grasslands. Although the pristine California valley grassland is nearly gone, the existing naturalized ("new natives") grasslands provide many of the same benefits as native grasslands, and as such are worthy of appreciation, enjoyment, and protection.



**Above: Site 300 annual valley grasslands: the "new native" grassland ecosystem?**



**Right: Site 300 grasslands dominated by one-sided bluegrass in spring.**

TINA CARLSEN



GARY A. MONROE

**Purple needlegrass**  
(*Nassella pulchra*)



GARY A. MONROE

**One-sided bluegrass**  
(*Poa secunda*)